THE Cane Growers' QUARTERLY BULLETIN

VOL. XXIV. No. 2 1 OCTOBER, 1960

BUREAU OF SUGAR EXPERIMENT STATIONS

BRISBANE QUEENSLAND

Registered at the G.P.O., Brisbane, for transmission by Post as a Periodical

Sugar Experiment Stations Board.

THE HON. O. O. MADSEN, M.L.A., Minister for Agriculture and Forestry, Chairman.
Dr. W. A. T. SUMMERVILLE, Deputy Chairman.
MR. J. W. INVERARITY, Member,
MR. A. G. MANN, Cane Grower, Member.

Bureau of Sugar Experiment Stations.

N. J. KING, Director.
L. G. VALLANCE, Asst. Director.
R. W. MUNGOMERY, Asst. to Director.

Head Office Staff.

J. H. NICKLIN, Chief Technologist (Engr.).
C. G. HUGHES, Senior Pathologist (I).
D. R. L. STEINDL, Senior Pathologist (I).
L. R. BRAIN, Senior Mill Technologist (II).
H. E. YOUNG, Senior Physiologist (II).
O. W. STURGESS, Research Pathologist.
K. C. LEVERINGTON, Research Chemist.
R. F. BEALE, Asst. Engineer.
A. D. DOOLAN, Laboratory Technologist.
J. R. BURGE, Analyst.
J. M. SEDL, Analyst.
C. C. HORNE, Secretary.
A. D. BEAL, Asst. Accountant.
S. C. LEDDY, Records Clerk.
E. J. Barke, Clerk.
B. HJELM, Clerk.
Miss F. M. DOOLAN, Librarian.
Miss E. O'SULLIVAN, Clerk.
Miss R. P. MORRISON, Labty. Assistant.
Miss J. E. MURPHY, Clerk-Typiste.
Miss B. A. VINES, Clerk-Typiste.
Miss M. P. LYNCH, Clerk-Typiste.
F. SHORT, Sen. Lab. Attendant

Country Staff.

Meringa. Address: P.O. Box 122, Gordonvale; Phone: Gordonvale 95.

J. H. BUZACOTT, Senior Plant Breeder (I).
G. WILSON, Senior Entomologist. (I).
J. C. SKINNER, Senior Geneticist. (I).
B. T. EGAN, Pathologist.
B. E. HITCHCOCK, Entomologist.
G. BATES, Senior Adviser.
A. G. BARRIE, Agronomist.
C. A. REHBEIN, Senior Adviser.
N. G. GRAFF, Technical Officer (I).
F. C. LINDSAY, Technical Officer (I).
G. H. WHITAKER, Field Assistant.
C. C. CORKILL, Cadet.
Miss N. J. SMITH, Clerk-Typiste.
Miss M. BARBER, Clerk-Typiste.
G. R. STROUD, Lab. Attendant.

Innisfail. Address: P.O. Box 630, Innisfail; Phone: Innisfail 271.

S. O. SKINNER, Senior Adviser.
I. T. FRESHWATER, Adviser.

Ingham. Address: P.O. Box 41, Ingham; Phone: Ingham, 468.

O. W. D. MYATT, Senior Adviser.
I. J. V. STEWART, Field Assistant.

Ayr. Address: P.O. Box 28, Brandon; Phone: Brandon 45.

G. A. CHRISTIE, Senior Adviser.
J. WESDORP, Asst. Agronomist.
L. S. CHAPMAN, Senior Adviser.
J. A. HUCKNALL, Field Assistant.
Miss B. L. LENNOX, Clerk-Typiste.

Mackay. Address: P.O. Box 280, Mackay; Phone: Mackay 2717.

G. C. BIESKE, Research Chemist.
C. G. STORY, Senior Adviser.
A. A. MATTHEWS, Adviser.
E. A. PEMBROKE, Adviser.
D. A. BEAK, Technical Officer (II)
C. E. GLOVER, Field Assistant.
Miss J. L. CRONIN, Clerk-Typiste.
Miss C. HARVISON, Clerk-Typiste.
J. VELLA, Lab. Attendant.

Bundaberg. Address: P.O. Box 138, Bundaberg; Phone: Canelands 228.

B. G. ADKINS, Research Mill Technologist.
A. G. CLAIRE, Mill Technologist.
R. B. MOLLER, Agronomist.
H. G. KNUST, Senior Adviser.
N. McD. SMITH, Senior Adviser.
E. D. JENSEN, Laboratory Technologist.
P. N. STEWART, Asst. Mill Technologist.
R. K. HILHORST, Technical Officer (I).
P. G. ARNOLD, Field Assistant.
Miss J. PRIEBE, Clerk-Typiste.

Childers. Address: P.O. Box 2, Childers; Phone: Childers 32.

J. ANDERSON, Adviser.

Nambour. Address: P.O. Box 139, Nambour; Phone: Nambour 668.

C. L. TOOHEY, Senior Adviser.

BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE CANE GROWERS' QUARTERLY BULLETIN

ISSUED BY DIRECTION OF THE
SUGAR EXPERIMENT STATIONS
BOARD

1 OCTOBER, 1960

Wholly set up and printed in Australia by
WATSON FERGUSON AND COMPANY
Brisbane, Q.

CONTENTS

This Bulletin is an official publication of the extension service of the Bureau of Sugar Experiment Stations, issued and forwarded by the Bureau to all cane growers in Queensland.

The Cane Growers' Quarterly Bulletin

VOL. XXIV. 1 October, 1960 No. 2

EDITORIAL

Cane Quality at High Level

While the 1959 season was characterised by the very high c.c.s. of cane harvested in Queensland, the present season has had an even more auspicious beginning. Except in the southern districts the early figures were generally higher than those for the same period last year.

The northern areas have been outstanding in this regard, the c.c.s. being one and a half units higher in the early weeks and about one unit towards the end of August. The figures were also somewhat higher in the lower Burdekin district, but a levelling out at the present time is placing the c.c.s. in a comparable position with that of last year. A definite early rise was also experienced at Mackay and excellent figures are being maintained in this district which is notable for its sweet canes.

Bundaberg figures were good as the crushing got into full swing but in general they were slightly below those of last year. On the other hand, Isis and Maryborough were higher.

There will again be cane that is unwanted, and much of this will be destroyed.

The difficulty of forecasting cane tonnage in order to control production is bad enough, but whether to gamble on these high c.c.s. figures being maintained in future years is a problem that is surely perplexing to growers.

Our opinion is that they will continue.

Rats and Their Control*

By C. G. STORY

It is obvious that large rat populations are prevalent in the central district this season. Already evidence exists of the damage due to these pests in cane fields. Control measures should be instituted on those areas subject to damage as soon as rat damage is noticed. A monthly check from May each year on such areas by individual cane growers will help to prevent damage before it assumes nuisance and economic proportions. Many cane growers in the district will require all their cane for harvest this year; rats should not be given the chance to reduce farm incomes unnecessarily.

Only two field species of rats assume economic proportions in Queensland. These are the field rat, *Rattus conatus,* and the smaller khaki rat, *Melomys littoralis*. The latter is a climbing species, it also inhabits swamp palm country, an environment in which the field rat is seldom found unless a grass cover is also present. The field rat is the one most commonly found in the central area. It is a burrower. Rat burrows at the base of stools are a common sight in rat-infested cane fields. The extent of these burrows is often surprising; a burrow always consists of a nesting tunnel with many more subsidiary tunnels developing from this, with at least one, though often more, reaching the surface for outlets. Tunnels have been known to extend up to 20 feet in length. During ploughing operations in a heavy legume crop this year on the Mackay Sugar Experiment Station, many rats were ploughed out of burrows. One particular count disclosed that 20 rats were killed from one burrow after the plough had destroyed it as a colony for the rats. Rats varied in size from adults down to the hairless pups of the colony. Compared with the house rat, the field rat is clumsy and when ploughed out, it attempts, with a hopping gait, to escape. On ploughed ground it is easily caught and killed.

The desirable natural living conditions for this pest are a damp, friable soil, capable of and actually providing close and substantial ground cover which is often referred to as harbourage. The presence of water near the burrows is not essential; it has been found that rats can live their normal life span relying only on dew, rainfall and food moisture for their requirements. Favoured nesting places are creek banks, small gullies and waste grasslands which are never disturbed. If areas such as these could be fenced and grazed by stock or fired as often as possible, the rat population would be reduced. Standover blocks of cane provide excellent harbourage and food supplies.

The average life span of rats kept under observation was two years and nine months. This may be realized under ideal field conditions but probably the life span under normal conditions would be less. The gestation period averages from 21 to 22 days and the litter size averages six. Some rats have 25 litters in their lifetime. It is obvious that a quick build-up in population can occur at certain times of the year under favourable conditions. It is considered that dry spring conditions depress breeding in the field and that a spring favourable for breeding pre-conditions rats for extensive breeding during the succeeding two or three years.

Feeding by the field rat usually takes place at night. Being a poor climber, *conatus* feeds from the

* A radio talk broadcast by Station 4MK.

ground; in cane fields, the stalks, if not sprawled or lodged, are first felled by attack on the lower internodes; bites on higher internodes are effected later. Attacks normally commence during the cold weather in June and July and continue through until the summer months. There are exceptions to this, due to different local conditions experienced and damage has occurred as late as January. The field rat, individually, is not as destructive to sugar cane as is the climbing species, *littoralis*. However, in some seasons, large populations of field rats attack cane fields, affecting extensive areas which have suitable environmental conditions and then true economic damage is comparatively high; this is due simply to mass attack. In other seasons, the area of cane attacked is often negligible and most of the damage is of a nuisance type only. The ability of the field rat, *conatus*, to sustain mass attack, places it first in economic importance as a rat pest of cane. Cultivated young cane is seldom attacked but in the central area in late 1957 and early 1958 numerous instances were noted where the basal portions of young shoots were attacked, the young leaves were shredded and torn and evidence was found of this material being used to line the nests. It was particularly dry at this time of the year.

Economic losses resulting from rat attack may occur from loss in tonnage of cane harvested, loss in sugar content of harvested cane, loss due to increased costs of harvesting, loss due to interference with general farming routine and straight-out rat control cost. On the first evidence of rat damage, even a few fresh bites, control measures should be instituted. As already mentioned, breeding habits allow a rapid build-up of population to occur. Control measures include farm hygiene in the form of destruction of all harbourage and cover where practicable; rats have a preference for the thinner, softer varieties but harder stalked varieties are attacked at times. Q.58 is very susceptible and therefore liable to extensive damage where dense rat populations are usually found, unless baiting is performed properly as a correct control. The third method is poisoning. Two different poisons are commonly used. The first is a phosphorus mixture made with golden syrup and flour spread on bread. This is very effective but should be used under dry conditions and replaced every few days, as once the bread dries out, it is unpalatable to the rat. However this method is less convenient than the use of thallium sulphate baits made up at a strength of one in 300. For rats to obtain a lethal dose, a certain amount of food has to be eaten. To ensure that this occurs, a base such as wheat which is attractive to the rats, is used in the preparation of the baits. The thallium sulphate bait is the most suitable under Queensland conditions, it is factory-packed in glassine packets which keep fresh for a considerable period and which resist a reasonable amount of moisture.

It is important that baits be laid correctly on a grid pattern. A small area should be cleared with a hoe at half chain intervals along every seventh row in the block concerned and three to four baits placed on this cleared area. If a harbourage area is to be baited, baits may be laid at a heavier rate. The time of baiting is most important. As soon as damage occurs, even if only a few bites, the baits should be laid. Other poisons are effective in killing rats but at this stage these are not recommended for use in cane fields.

Advice on rat control is one of the services provided by Cane Pest and Disease Control Boards and enquiries

made to the nearest Board Supervisor in your area will receive early attention. Supplies of baits are also provided by your Board. The main points to be considered with rats are the destruction of harbourages as often as possible, correct usage and placement of baits and the most important, baiting as soon as signs of damage occur. These points will assist in controlling rats and minimizing damage.

Poisoning Coots

The red bill or coot is a bird pest responsible for damage to sugar cane crops in areas adjacent to lagoons, watercourses or low wet areas. This bird damages mature cane by stripping lengths of rind and eating the soft interior portion of the stalk. Further damage occurs when the birds roost in the top foliage; this action breaks and flattens the tops.

During the last few years, Mr. R. H. Robinson, Supervisor of the Proserpine Cane Pest and Disease Control Board has reported coot damage prevalent from March to July in that area. It was noted where coots predominate that, following harvest, these birds were making a hollow in the top portion of the stubble by eating the exposed portion. A very successful poisoning experiment was conducted on the following basis in 1959.

Stalks of cane were cut into 18 inch lengths, a small hole about a quarter of an inch deep was made in one end of the cut portion of the stalk and a few grains of strychnine were placed in the hole. The lengths of cane stalk were pushed into the soil leaving approximately one foot of the treated end above the ground. Thirty-six of these baited stalks were placed in position, one to every two chains, along water furrows where the birds were feeding. The reason for selecting this position was that the birds usually congregate along the water furrow and it enabled a better check to be kept on the baits.

Thirty-four dead birds were found within two days of baiting and the coots had almost disappeared from the farm. There is a distinct possibility that there were more than 34 fatalities as many of the dead birds were found some distance away from where the baited stalks were placed and a number may not have been located in the heavy crop of standing cane.

Freshly cut cane is more attractive to the birds when used as bait than cane left for two or three days. All baited stalks were collected after three days. —C.G.S.

Table Showing Susceptibility of Varieties to Frost Damage (see page 43)

Variety	Foliage	Stalk	Variety	Foliage	Stalk	Variety	Foliage	Stalk
C.P.29/116	1	5	Q.50	2	3	Q.70	3	2
N.Co.310	3	1	Q.55	4	4	Q.71	2	3
Pindar	2	1	Q.58	5	4	Q.72	3	4
P.O.J.2878	4	4	Q.61	5	3	Vesta	2	4
Q.47	3	3	Q.63	3	3	53S.47	1	2
Q.49	3	3	Q.69	3	2	H.48-3166	1	3

1. High resistance 2. Fair resistance 3. moderate resistance
4. Fairly susceptible 5. Very susceptible.

A Word on Frost Damage

By N. McD. SMITH

Severe frostings occurred in the Bundaberg area during the 1960 winter and it is of interest to point out the wide variation in tolerance to damage shown by the leading cane varieties and to emphasize that only by slicing stalks can a grower truly assess the extent of injury.

Under similar conditions, and if leaf symptoms are taken as a measure, one might be excused for assessing Q.50 as more resistant to frost damage when compared to N.Co.310. Furthermore if C.P.29/116 were in the same field, the greater amount of greenness would place it as being better than both these canes. However, on slicing it will be seen how unreliable foliage symptoms can be as an indication of damage to the stalk. The order of resistance displayed would be obvious and on inspection would show that N.Co.310 had sound eyes and growing point, and dead spindle; with Q.50 the growing point would be killed and the topmost eyes dead; C.P.29/116 would be the worst affected as the growing point and eyes on the upper quarter of the stalk would be dead.

Observations were made during July and August to assess the relative resistance to frost of the approved canes, and the most promising of the experimental varieties.

The accompanying table (bottom of page 42) sets out the findings and shows that the amount of the damage to foliage should not be accepted as a guide to the extent of injury to the stalk.

It must be remembered when studying the table that there is also a range of resistance to decomposition following frost injury. There is sufficient knowledge on this aspect to state that N.Co.310 resists rotting of the stalk, following injury to the growing point and eyes, to a much greater extent than other approved canes. This is important for it means in practice that, if a farm is badly frosted, a grower can adopt the broad principle that N.Co.310 will remain an economic proposition for a greater length of time compared to others on the approved list.

"Hearting" is a term frequently used by farmers to indicate that the lower end of the spindle has been killed and thus the whole may be pulled out very easily. This is not always a guide to the state of damage to the growing point. Often "hearted" cane continues to grow from the damaged growing point, pushing out the old dead spindle in the process.

A risk associated with all frosty localities is the use of affected cane for plants. Digging out the eyes with a thumbnail is not wholly reliable as oftentimes the internal tissue thus exposed discolours quickly and this may be mistaken for damage by frost. Furthermore, the growing point of the eye is not always exposed and it is damage to this section which has to be determined, not the condition of the scales which cover the eye. Experience has proven that slicing the stalk in such a way as to pass through the eye in its length gives the most accurate estimation of suitability for planting material.

Lindane Applicator for Greyback Cane Grub Control

By L. S. CHAPMAN

This paper is presented in the form of a report on the developments which have taken place over the last two years on the lindane applicator for the control of the greyback cane grub. A paper was presented at this conference in 1958 on a prototype machine which was built by Messrs. S. and R. Pirrone.

In November, 1957, and January, 1958, strip trials were laid down on two farms in potentially heavily grub infested areas. In each of these trials strips sprayed with lindane at the rate of 2 lb. per acre were alternated with strips dusted in the normal manner at the rate of 75 lb. of 20 per cent. BHC dust per acre. On one site the strips were six drills wide and in the other eight drills wide. Because of the severe damage usually inflicted annually on these farms by greyback grubs, no strips were left untreated as check plots. Unfortunately, prolonged floods in early April, 1958, inundated the trials for two to three weeks, thus reducing the grub population drastically. Inspections following this flood indicated that there had been no greyback grub damage in either the dusted strips or the strips sprayed with lindane. In addition to these two trials, there was approximately 200 acres of cane treated that year with lindane. Two machines were then operating in the district. No grub damage was observed in any of the blocks treated with lindane.

At the end of 1958 two more strip trials were put down and included in the trials this time were additional strips sprayed with aldrin 30 per cent. wettable powder at the rate of 6 2/3 lb. per acre. This latter application corresponds to two pounds of active ingredient aldrin. Once again conditions were not suitable for heavy grub infestation and it was not possible to conclude positively that the lindane or aldrin applications had been 100 per cent. effective in controlling greyback grubs.

Inspections of the ratoons of the trials put down in 1957 indicated that there had been no damage by greyback grubs, and similarly no damage was noticed in the ratoons of the 200 acres sprayed in 1957.

In 1958, over 100 acres were again sprayed with lindane. Thorough inspections of the ratoons of the trials established in 1958 showed that there had been no damage by grubs. All of these trials have been put out against greyback grubs for this is the only type of white grub which causes damage in the Burdekin district.

Following the publicity which was given to these trials, the Inkerman Cane Pest and Disease Control Board instructed its supervisor, Mr. J. L. McGee, who obtained permission from Messrs. S. and R. Pirrone, to make two machines using the patent that was pending. Mr. McGee produced two units which were easily attached to Farmall "M" tractors. These machines differed considerably from the original and incorporated some new ideas in regard to positioning the nozzles. These machines had the nozzles situated at the end of the hangers on the front of the tractor, and behind these were the cultivation tynes and discs which covered the lindane band as soon as it was applied. At the end of 1959, these two machines had applied lindane to 305 acres in the Home Hill area.

The patent rights of the machine,

which were taken out by Messrs. S. and R. Pirrone, were then offered to Mr. J. Nuttall who has since done a lot of experimental work on the machine, and improved it immensely. Firstly he has modified the drum so that it can be fitted to any make of tractor. He has made a different arrangement of the shields which protect the nozzles, and this can be bolted to any type of tyne implements in use. Special rigid plastic tubing has been obtained. An improvement in the agitation of the spray in the drum has been made by incorporating a ventural gun in the system. The spear which was originally positioned to deliver into the apex of the drum has been lcoated on the side of the drum with better results. The suction side of the ventural gun has been attached to the apex of the cone of the drum, and this draws spray from this point and delivers it down the spear to supplement the flow of spray from the pump, thereby improving the circulation in the drum, and therefore the agitation of the spray. A patent has been taken out on this device.

Every effort has been made to keep the cost of this machine as low as possible and a ¾ inch geared pump was used. One unit treated 400-500 acres this year and little wear has been noticed in the gears. Where two rows are to be treated at once a one-inch pump will be used in the future.

In addition to the area treated in the Home Hill district by Mr. McGee's machines, 1400 acres were treated in the Ayr and Giru districts by eight of Mr. Nuttall's machines which were given out on loan this year to any farmer who wished to use them. A further 10½ acres of plant cane on the Experiment Station at Brandon were treated with lindane in November, 1959.

With the present arrangement, the Nuttall machines are applying the 2 lb. of lindane per acre with 20 gallons of water plus a wetting agent at 20 lb. p.s.i. pressure. Modified Monarch fan-shaped No. 59 nozzles were used. These modified nozzles are not completely satisfactory as they tend to concentrate the spray towards the edge of the spray fan. An improved nozzle which will produce an even fan and deliver approximately 15 gallons per acre is envisaged for next season.

Mr. McGee's machines have been operating with a smaller nozzle, namely the Monarch fan type No. 46, and this has been giving a good fan pattern delivering 13 gallons per acre. Various grades of lindane varying from a 50 per cent. micronized product with a particle size of 5 microns to a 99 per cent. grade, which passes through a 325 mesh screen, have been used by Mr. McGee and records have been kept of the blocks on which they have been sprayed. It will be of interest to ascertain in due course whether the persistence of these products in the soil is influenced in any way by their particle size.

In the Home Hill area, up to mid-December, 1959, Mr. McGee had 304 acres treated with BHC dust and 305 acres treated with different grades of lindane. A close watch will be kept on these treatments, particularly in the first and second ratoons to see if there has been any excessive deterioration of the finer product.

At this stage it is of value to compare the two methods of applying BHC, i.e. by spraying lindane, or by applying it as BHC 20 per cent. dust. The first consideration is *cost*.

Lindane costs 30/6 per acre compared with BHC dust which recently dropped in price and now costs about £3/15/- per acre.

Ease of application

In an eight-hour day under normal conditions 20-22 acres of cane were sprayed with lindane at 2 lb. per acre.

10-11 acres of cane were treated using a dust machine applying 20 per cent. BHC dust. It can be pointed out that on a windy day it may not be possible to apply the dust.

Evenness of application

Application is superior using lindane in comparison with the dust, and the lindane is easier to direct into the most effective position around the stool.

Calibration of rate

This is extremely simple with the lindane machine, as it is only necessary to determine how much liquid is being delivered per acre, the 2 lb. of lindane then being added to that volume of water. After calibration there is no variability in the rate of application as in applying dust because of the differential moisture content and therefore running qualities of the dust.

Another advantage of using lindane is that it does not have the offensive smell of BHC dust.

In conclusion it can be stated that all the growers who have applied their lindane in this manner have been favourably impressed by this method, and they have said that the application has been easier, more precise, and less costly than an application involving the equivalent BHC dust. From a practical point of view it is difficult to see why this method should not be adopted for all grub control work.

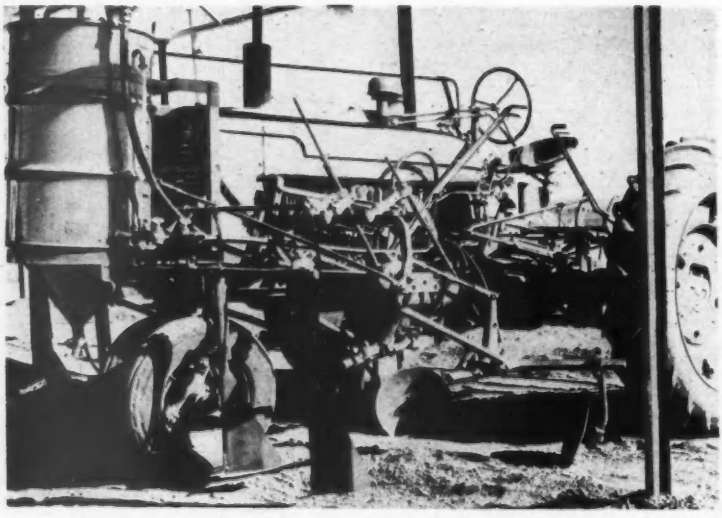

Fig. 14—A tractor mounted spray for two-row application of lindane.

*Wallaby Deterrents

By L. S. CHAPMAN

In the hot dry spring months grazing land in the Lower Burdekin becomes parched and tinder dry, and during this time of the year wallabies invade the cane areas adjacent to grazing land in large numbers to feed on young, irrigated cane shoots. They show a marked preference for the younger shoots, and they feed nightly over a restricted area, continually nipping off the shoots at ground level as they emerge.

The unsuccessful use of the carbide gun for scaring these pests has previously been recorded, (Christie, Cane Pest and Disease Control Boards' Conference, 1959) and following this failure several other possible deterrents, which had been used by farmers with varying results, were tried.

Initially observation trials were put down using blood meal, blood and bone, and BHC. These substances were each used in three different ways. Firstly, they were applied as a band of material some three feet wide, sprinkled around a plot ten rows wide by two chains long, since the outside ten rows were the ones mostly eaten by these wallabies. On inspection two weeks after applying these materials in this manner, it was found that the wallabies had continued to feed on the untreated check plots which were left at regular intervals between the treated plots. They had also fed on cane within the treated squares. It was evident from the tracks made by the wallabies that a narrow band of the materials used would not prevent them from moving over the band and feeding on the unprotected cane within the square.

In the second experiment, the three materials were applied as a light dressing of approximately one hundredweight per acre sprinkled along the drill. Every drill was treated and the same sized plots were employed. In one set of plots the cane leaves were first sprayed with a film of water to simulate dew, since it had been claimed that best results were obtained by applying the deterrent early in the morning while the dew was still on the leaves. In the third set of plots the materials were sprinkled on the dry leaves.

In all cases where these trials were put down the cane had been extensively damaged by the wallabies. Only two to three small half-chewed leaves were left on the primary shoot and there was little or no stooling. The remainder of the block, which was little affected by these pests, had stooled out normally and was two to three feet tall overall.

After two weeks it was found that the wallabies had ceased feeding on the plots where blood meal or blood and bone had been applied, but the BHC had no deterrent effect. Blood meal or blood and bone appears to have the same lasting effect and it was four weeks before the wallabies recommenced feeding on the young shoots.

There appears to be some slight benefit to be derived from wetting the cane leaves before applying the blood and bone, but in practice it is doubtful whether this would be warranted as this material applied dry had worked satisfactorily. It was noted that the deterrent, even when spread over every row, did not restrain the wallabies from moving through the block which was treated. After a month the paddock was

*The identity of this wallaby is *Wallabia agilis*, Gould, popularly known as the "sandy" wallaby.

worked and irrigated, and a deterrent effect of four weeks appears the maximum that can be expected.

If two applications of blood meal or blood and bone could be given at monthly intervals this would enable the cane to make such headway as to be unattractive to wallabies at the end of that period—at least under irrigated conditions.

Following this initial success with blood and bone, a field of three acres was treated. A strip eighteen drills wide was treated down each row and then the remainder of the block was surrounded by a strip twenty feet wide. The area within the hollow square was kept grazed by the wallabies to ground level, but the treated area, even the strip around the perimeter of the block, came away and grew without being eaten. After four weeks, storm rains fell and the wallabies then moved out into the grazing country. By this time, the cane in the treated area had grown to two feet high while the untreated area was completely bare.

Experience on four other farms showed that an application of blood and bone on every drill controlled the pests. One attempt was made on a site to spray on a slurry of dry blood meal and water, but, with the equipment available this proved unsuccessful.

The vigilance of a group of youths supplied with ammunition and a .22 rifle has proved successful on one property in deterring these pests. On another property a grower reported that a shot gun is more valuable in scaring these pests than a rifle, and he attributes this to the greater noise associated with the shot gun. Another farmer found that snaring the wallabies and leaving the carcasses in situ was also effective.

Fig. 15—Control of Wallaby damage with blood and bone. The untreated cane in the foreground was practically eaten out while the treated cane in the background was untouched.

A New Sport in Q50

By C. G. HUGHES

The term "sport", according to a dictionary of botanical terms, is a "variation starting from a bud". As such, sports are of great interest to those concerned with sugar cane, since all cane varieties are based on the propagation of uniform planting material from a range of selected varieties. There would soon be chaos if these did not yield reasonably uniform stools at every planting, for not only would variations in appearance occur but variations in disease resistance, in yield, in sugar content and in agricultural characteristics would also be expected.

Established varieties of sugar cane have a genetical make-up which is in delicate balance with the environment to yield a satisfactory, economic product. They have been specially selected on account of this particular ability. It can be readily understood therefore that any variation in this genetical equipment, i.e. any sport produced, is virtually certainly not

Fig. 16—A sport in Q50—The alternating zones of white and green are attractive but the loss of chlorophyll is serious as far as making sugar is concerned.

—Photo C. G. Hughes

an improvement and can easily be a serious handicap.

Sports, or mutations as they may also be called, are not common and the most frequent occurs as only an infinitesimal fraction of all stools grown. Colour sports, either as a change in colour or as striping, are possibly the most numerous but others may affect the shape of the stalk, the arrangements of the leaves on the stalk, the growth habit or the shape and colour of the leaves. The sport of Q.50 shown in the illustration is in a field at Bundaberg; the alternating zones of cream and green give the leaves a most attractive appearance but the loss of chlorophyll is serious for the plant, and affected stools could not keep pace with their normal neighbours.

A Junior Farmers' School

The first sugar cane extension course for Junior Farmers was held at the Central Sugar Experiment Station, Mackay, from the 22nd to the 26th February, 1960 inclusive. The course was arranged by the Bureau of Sugar Experiment Stations at the request of the Queensland Junior Farmers' Organisation. Members, over 18 years of age, actively engaged in sugar cane growing were eligible to attend. A total of 33 Junior Farmers attended from the following cane growing areas: Beenleigh, Bundaberg, Calen, Edmonton, Finch Hatton, Gin Gin, Giru, Ingham, Lower Burdekin, Marian, Mulgrave, North Eton, Proserpine, Racecourse, South Johnstone and Yandaran.

The programme included lectures and discussions on cane breeding, pathology, entomology, cultivation practices, plant nutrition, care of farm machinery, legumes, weedicides, c.c.s. and tropical pastures. A tour of the Experiment Station, and visits to Greenmount cattle property and stud. C. A. Hodge and Son's implement works, with an address on plough setting by Mr. M. Hodge,were among the features of the week. Inspection of cane diseases, insect specimens, practical demonstration of legume seed inoculation, showing of 35 mm. slides devoted to various subjects and discussion groups completed the programme. The final session was a general discussion and review of the school with suggestions as to how possible future schools may be conducted.

The visiting Junior Farmers were billeted with families of various Mackay Junior Farmers which enabled them to appreciate problems associated with the sugar industry in various parts of the State. The participants all agreed that the first school was very successful and that, if possible, it should be made an annual event.

—C.G.S.

Curvature of Cane Setts

By J. H. BUZACOTT

It is not uncommon for farmers to find, some days after planting their fields, that certain of the setts curve badly and one or both ends of the sett come out of the ground. It is, in fact, a practice with some farmers when this happens, to run their tractors up the drill which results in breaking the curved plants and pressing the ends into the soil so that a germination will result.

This year, on a farm in the Gordonvale district, the sett curvature was present to such a marked degree that the sett ends were sticking up some six inches above the surface of the drill.

Approximately every fifth sett was curved, this being due to the fact that only top plants were affected. The situation was not amenable to the tractor treatment as the curvature was too great and the tractor wheels would completely displace the setts. The farmer had no alternative but to cut the offending setts in two and replant them.

The condition results from an elongation of the parenchyma cells in the growth rings on the lower side of the plant only. This is due to an effect produced in the growth ring by one of the growth producing substances called auxins present in the cane stalk. It is an interesting fact that the effect does not occur in setts which have been treated in hot water, since this inhibits the effect of the auxin concerned.

In the particular case cited above, the fact that the curvature was unusually pronounced was probably due to several reasons. The cane was planted on a river flat farm where planting can seldom be done before June, whereas this year, due to an early cessation of the wet season, the fields were planted at the end of April. This implied, firstly, immature plants in which the auxin content would be higher than normal in planting material and secondly, high soil temperatures and good moisture

Fig. 17—The characteristic result of the curvature of the setts in the drill.

—Photo J. H. Buzacott

which also appear to accentuate the trouble. It was further increased by the fact that the setts were cut very long, from 18 inches to 24 inches, and the cane was topped very high, which implies a greater content of auxin, since the growing point is the point of manufacture of auxins. The two varieties planted at the time,

Pindar and Co.475, were both affected.

The avoidance of similar trouble in future seems to lie in the selection of reasonably mature cane as a source of plants, topping the stalks back to firm cane and cutting the plants shorter.

Fig. 17 shows the characteristic appearance of the curved setts in the drill and Fig. 18 the degree of curvature, the amount of cabbage and the length of the setts which were most affected.

Fig. 18—Showing the degree of curvature, the amount of cabbage and length of setts.

—Photo J. H. Buzacott

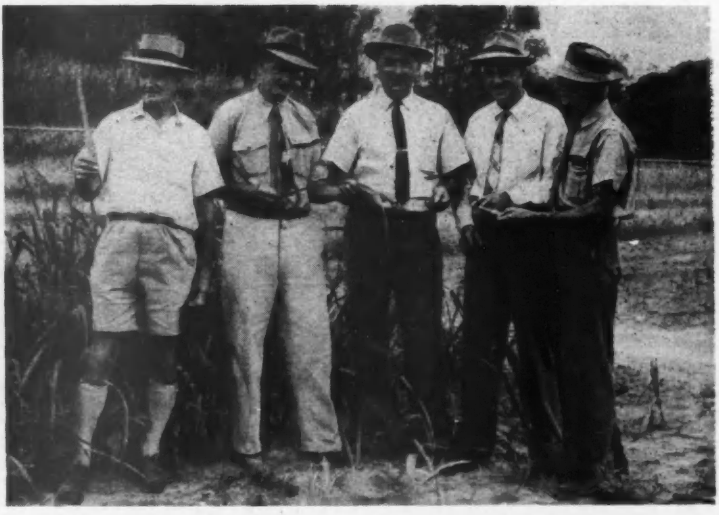

Fig. 19—Well known to many cane growers. Pest Board Supervisors inspecting cane at the Bureau's Pathology Farm. From left, Mr. M. H. Wells (Nambour), Mr. N. Courtice (Bundaberg), Mr. P. Volp (Mulgrave), Mr. E. J. R. Luckett (Isis), Mr. A. R. Taylor (South Johnstone.)

—Photo C. G. Hughes

Fig. 20—Breeding cows on a cane-cattle property, Mackay district.

Fig. 21—Another sign of the times—Cane growers interested in a bull sale, Mackay district.

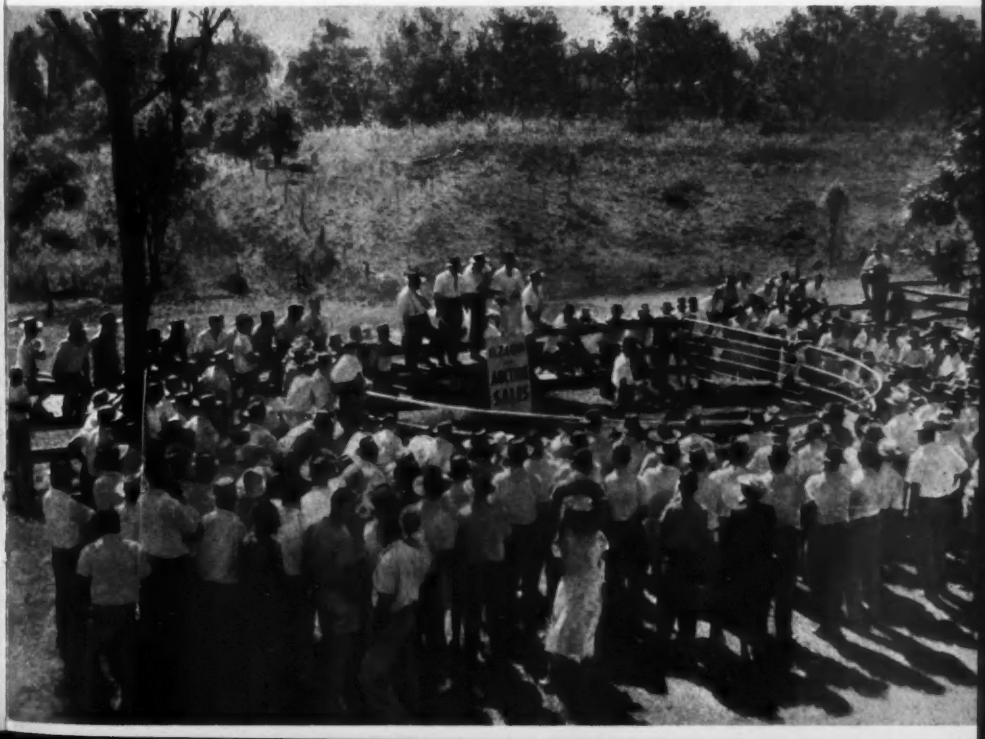

Fig. 22—Picturesque surroundings at Mossman Mill.

Fig. 23—At harvest time, Habana area, Mackay.

Fig. 24—A colourful corner in the grounds of the manager's (Mr. L. J. Prince) residence at Mossman Mill.

Fig. 25—The Barron Gorge with cane lands in the background.

Fig. 26—A warning at Mourilyan. Isolated patches of giant sensitive plant are marked, treated and every effort made to prevent spread of seed.

Fig. 27—A demonstration of a rotary slasher destroying unwanted cane at Racecourse, Mackay.

Field Day Address, Bundaberg, 1960

By L. G. VALLANCE

Sugar cane varieties are of such importance in the everyday business of cane farming that it is always of interest to have a look at the performance of the various canes upon which we depend. Last year's harvest, i.e. 1959, for example, was the first time for fourteen years that C.P.29/116 was not the leading cane in any one of the four Bundaberg mill areas. This was also so at Gin Gin, but not in Isis. This popular variety which has done so much for the southern districts first took the lead in Fairymead and Gin Gin mill areas in 1946 by displacing the widely grown Co.290. By 1947 it had displaced P.O.J.2878 in Qunaba, Millaquin and Bingera and it then occupied first place in all areas except Isis. The following year Isis growers also swung away from P.O.J.2878 in favour of C.P.29/116 and in this district it has held pride of place ever since.

However, with the passing of the years, the leading cane at the present time in most of the mill areas is N.Co.310. This cane which was imported from South Africa has made rapid advancement in the past few years, most of which has been at the expense of C.P.29/116. As a matter of fact the tonnages for Fairymead, Qunaba, Millaquin and Bingera mill areas show that the percentage decline of C.P.29/116 over the three years 1957, 1958 and 1959 has been practically equalled by the increase in N.Co.310. For example, C.P.29/116 fell from 37 per cent. of the total in 1957 to 13 per cent. in 1959 whereas N.Co.310 rose from 13.7 per cent. to 35 per cent.

This, most certainly, is a matter for considerable satisfaction, because there is no doubt of the improvement in quality it has brought to the early harvest of district crops. Since N.Co.310 is now so well known to most of you there is little need for me to dwell on its virtues, but this cane has demonstrated its ability to produce satisfactory crops under a variety of conditions — ranging from good to poor — and at the same time being of higher than average c.c.s. These are reasons why nearly a half-million tons of it were milled in these districts in 1959 and why even more will be harvested in the future. Its free arrowing habit is a drawback that growers need to be aware of, and this makes autumn planting a necessity in practically all cases.

It is of considerable interest that these two imported canes, N.Co.310 from South Africa and C.P.29/116 from America, have competed so successfully with our locally produced varieties. It is also noteworthy that they took over from two other foreign canes which previously held first place, i.e. from Co.290 — an Indian cane and P.O.J.2878 from Java. This is in spite of the fact that, throughout the State, Queensland bred canes now comprise 82 per cent. of the total crop. In fact the only other non-local cane which receives a mention in approved variety lists is Badila — and since this comes from New Guinea it cannot be classed as a cane that was bred for overseas conditions. Therefore it is evident that there is considerable merit in the Bureau's practice of importing, through quarantine, the leading canes from overseas sugar countries. There are many of these on the Experiment Station at the present time and several are undergoing trials on district farms.

One of these which might receive mention is a Hawaiian cane, H.48-3166. As far as I can recall this is the first variety from Hawaii that has ever shown much promise under our conditions. Canes in that country are bred for a two year crop and

they usually fail to make the grade under the shorter growing season that we require here. We have been mainly interested in them from a standover point of view but they normally have a sprawling habit in the second year of growth and are generally unsatisfactory because of this. H.48-3166 however is of interest because of its erect and vigorous growth in the trials on some of our district soils of a poorer type.

In the final assessment it may not measure up to expectations but, as the trials progress, it is being observed very closely in all its stages of growth.

Of our own new canes perhaps the one that is of greatest interest to district growers is Q.71. This is a cross between the Indian cane Co.270 and P.O.J.2878, the former being also the female parent of Trojan and Pindar. Q.71 is noteworthy because of its very high sugar content at the beginning of the season and because of this outstanding characteristic it seems likely to become a most useful cane for these districts. Its growth habits are good. Although we do not regard it as a particularly heavy cropper it will produce quite average yields under a wide range of conditions. If all goes well and sufficient disease free planting material is available we hope to place it on the approved lists for 1961.

Another modern cane that is under test here is Q.63. This is the Mackay cane which last year received quite an amount of publicity because of its ability to register very high c.c.s. values at Mackay mills. To date its performance at Bundaberg in spring planted plots has not been outstanding, but this coming season we will have for the first time a series of autumn plant plots available for testing purposes. If it maintains its Mackay reputation for quality then it will undoubtedly have a place here, possibly it will require soils in the medium to good fertility range.

The North Queensland variety Q.67 is also undergoing trial. This is an anti-lodging cane and is one of the most erect canes the Bureau has ever developed. It was bred at our Burdekin Station and requires very fertile growing conditions to produce a good crop. There are only a few areas here in which such a cane as Q.67 may be suitable and we are most interested to see whether it will perform satisfactorily under the much cooler conditions existing in the south.

A series of standover trials are in progress in which the possibilities of some of the new non-arrowing and sparse arrowing canes are being investigated. These include Q72, the cane released last year at Isis, the Mackay cane Q.68 and several others. In some of these trials is P.O.J.2961 a cane from Java and a stablemate of P.O.J.2878 which has been a reasonably reliable standover variety for many years.

I mentioned at the beginning of this talk that Isis was the one area in which C.P.29/116 was still the major cane. No one realises better than I do the difficulties which that district frequently encounters nor do I underestimate the asset which C.P.29/116 has been to the area. On its 1960 estimate, in spite of dry weather, the capability of this district of being one of the largest mill areas in the State is clearly illustrated. As a matter of fact the crop estimate for Childers this year is second only to that of the Victoria mill area at Ingham in the whole of the State. The fact that this huge crop can now be grown in the Isis district is possibly due to several factors — but it would be difficult to deny that the largest single factor is C.P.29/116. Unfortunately the crop cannot be harvested since there will be again much excess cane.

It seems to me therefore that the time is ripe for Isis growers to concentrate more on the higher quality

canes. Canes like N.Co.310 and Q.50 could undoubtedly replace much of the C.P.29/116 and I hope that the newer canes Q.69 and Q.72 will soon be allowed to demonstrate that they are capable of improving cane quality in the Isis. There is nothing fundamentally unsound in growing the same amount of sugar with less cane.

In conclusion I would like to congratulate Millaquin and Qunaba growers for gaining first and second place respectively for tons of cane per acre in the whole of the State.

This is a worthy achievement for two southern mill areas and it very clearly outlines the importance of this fine district in the economy of our sugar industry.

Soil Erosion Control in Fiji

Apparently soil erosion in the sugar-cane areas of Fiji is a matter for considerable concern, and an important soil conservation order came into force there on 1st January, 1960. The December, 1959, number of the Agricultural Journal, issued by the Fijian Department of Agriculture, referred to this matter as follows :—

"The Land Conservation (Planting of Sugarcane) Order, 1959, requires that all sugarcane grown in the Colony shall be planted in drills or furrows running across the slope and at right angles to the fall of the land; in other words, all sugarcane must be planted on the contour. This Order will not come as a surprise to any cane farmer. Many farmers have long been converted to contouring and, with the introduction of simple levelling instruments, it is expected that progressive farmers will start to run their own contour lines. But there are still too many farmers who need this Order to shepherd them into the conservation fold; from January 1st, 1960, they are on their way in".

Under similar circumstances many soils in some of the hilly, cane-growing districts of Queensland have also progressively deteriorated as a result of both gully and sheet erosion, but a growing awareness of this insidious wastage has been built up in the minds of most growers, and large numbers have adopted contour planting or some modified system in an attempt to arrest this loss of fertile top soil. It is hoped that these leads will encourage neighbouring growers to follow suit and preserve the good earth for posterity, thereby rendering unnecessary in Queensland the enactment of special legislation to enforce any such measures.

—R.W.M.

The Burns Vertical Cane Slasher

By N.McD. SMITH

The 1959 season brought with it the problem of over-production and the disposal of surplus cane crops. At Bundaberg, total destruction of fields was effectively dealt with by chopping up the burned, flattened crop with rotary hoes or weighted cutaway discs. Other methods employed were, (a) proceeding directly into the standing green crop with a rotary hoe; (b) chopping up the green or standing crop with a forage harvester, grazing off the crop to stock, then ploughing in the burned residue, or (c) sometimes a bulldozer was used to flatten the green crop after which a running fire disposed of the bulk of material before discing and turning under with a plough.

These methods in the main were those most popular for the total destruction of surplus cane. In the event of a field being required for ratooning the operations most favoured were, (a) the hand cutting and piling of the stalks into windrows, (b) the flattening of a burned crop with chopping of the stalks by weighted discs and raking residue into windrows, (c) the use of a 'Bonel' cutaway disc implement which chopped up the standing crop and left residue in the interspaces, or (d) the laborious process of cutting the crop and carting it off the field to be dumped.

Fig. 28—The Burns vertical slasher, a side view.
—Photo N. McD. Smith

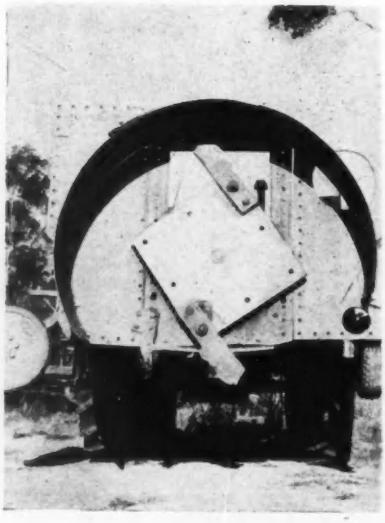

Fig.29—The Burns vertical slasher from the rear
—Photo N. McD. Smith

In the Bundaberg area the use of slashers has not been adopted to any extent as a means of overcoming the problem. Only in one instance was a horizontal type slasher used and then on a very limited scale.

As the 1960 season appears to present a similar situation in the way of unwanted crops, the advent of a

local development in the form of a cane slasher is of interest. Mr. G. Burns, Clayton, has patented a vertical cane slasher that has worked successfully on his own and neighbouring properties, handling crops of up to 60 t.p.a. standover. Either the burned or green material is handled quite satisfactorily and the blanket of cut up pieces may be left on the soil surface or else raked into windrows for disposal.

The unit is sturdily constructed and a tractor of minimum 40 h.p. is required to drive the machine.

The prototype as illustrated in Figs. 28, 29 shows the arrangement of fixed slasher blades. From the p.t.o. of the tractor the drive is taken through a universal to a slip clutch. Two self-aligning bearings are placed on the final drive shaft to the revolving plate which is of half inch steel.

The two attached knives are straight edged and of heavy steel with hardened cutting surfaces. Initial trials using swinging blades were not successful. One of the early difficulties of stalks jamming under the machine and causing it to lift has been satisfactorily overcome by fixing a rolling disc coulter. This has the effect of clearing any material which might clog the undercarriage and not allow cutting blades to operate at the desired level.

Apart from cane slashing, other adaptations of the machine are as a stubble shaver, a weeder and a cleaner for water carrier ditches. By changing the straight slasher blades to a pair having a right angle bend at the extremity a good job of stubble shaving can be performed. The only disadvantage foreseen during demonstration was the rather restricted area of cut as imposed by the sector of contact at soil level. The job of spinner weeding was excellent and is shown in Fig. 30. For this job the slasher accessory is removed and replaced with a spoked spinner similar to the conventional type.

As a cleaner for irrigation or drainage water channels the spinner-weeder has possibilities by adaption of the shape of the ends of each spoke. Fig. 30 shows a row of young plant cane cleaned with the spinner-weeder attachment.

Fig. 30—A row of young plant cane cleaned with the spinner-weeder attachment to the Burns slasher.

—Photo N. McD. Smith

Leaf Scald South of Townsville

By C. G. HUGHES

A map prepared in the middle 1930's by the Bureau (but never published) showed the bacterial disease leaf scald as being present in the far North, as well as at Mackay and Bundaberg. Soon afterwards, however, owing to the extended planting of the newer, more resistant varieties, the disease became impossible to find in these latter districts and the only subsequent records south of Townsville were on the South Coast near Southport in 1950, and at Moreton in 1952. The infection on the South Coast was in fodder cane on a dairy farm well removed from any sugar cane. That at Moreton affected only a few stools in commercial cane plantings and losses were negligible.

The disease had been inconspicuous for so long that it was an unpleasant surprise when leaf scald was found at Bundaberg in April of this year and at Childers, Mackay and Proserpine a few weeks later. To date, practically all infection has been in the new variety Q.63, which was known from trials to be susceptible to the disease. The source of infection is unknown but the bacterium causing leaf scald is notorious for its ability to live in cane without showing any external or internal symptoms of its presence. Some 15 farms are infected at Bundaberg, one at Childers, three at Mackay and four at Proserpine.

Symptoms

External symptoms of leaf scald occur in two distinct phases :—(a) a chronic form in which the stalk shows obvious symptoms and persists for an indefinite time in a state of ill-health and (b) an acute form in which the stalk suddenly wilts and dies. Either phase may occur independently in a stool and sometimes both together.

The Chronic Phase—In this phase, the one really typical diagnostic feature of the disease shows in the streaks on the leaves. These are straight, narrow and well-defined and follow exactly the veins of the leaf blades. They are usually quite white in colour and as they look for all the world as though ruled along a straight edge are generally referred to as "pencil-lines". They may pass down onto the leaf sheath, where they often assume a purplish tinge, and are to be seen on the youngest leaves. The lines vary in length from very short (when diagnosis can be difficult) to the full length of the blade and sheath.

Older streaks tend to broaden and become diffuse as the effects of the death of the whitened vein are felt on the tissues of the leaf, and some withering and death may develop. This may appear first in the middle portion of a streak but usually it commences at the outer edge of the blade, proceeding inwards as the leaf ages.

The typical well-developed streak shows a regular, white pencil-line in the lower part, broadens out as it goes upward and runs to the leaf margin in a wide area of dead leaf blade. The death of the edges and tips of the leaves gives to the top the "scalded" appearance, which gives the disease its common name. The leaf damage also leads to an upward curving of the blade and when several leaves on the one stalk are affected, the inarching leaves give a general effect not duplicated in any other disease.

Side shoots commencing first towards the base are also a prominent feature of the chronic form as the disease or season slows the upward growth of the main stalk. The side shoots often show excellent pencil-

lines or a chlorosis. The same type of chlorosis, or loss of green colour, may also occur in the top, when one to many leaves may be affected, or in young shoots coming away from diseased setts or ratoon stools.

The Acute Phase—A sudden inexplicable wilt and death of a single stalk or a whole stool is characteristic of this phase. The death on occasions may be very rapid, as has happened at Bundaberg and Childers this year, and less than a fortnight may see the change from an apparently healthy stool into dead trash, without a trace of green. The wilting usually shows in scattered individual stools although it may be in patches. It is most common in dry weather during the latter part of the crop's growth. Diagnosis of leaf scald on the acute phase alone is often difficult unless there is a history of the disease, but sometimes small basal shoots showing pencil-lines may appear.

Internal symptoms of leaf scald consist of reddened vascular bundles at the nodes with numbers usually related to the amount of streaking on the leaves. The vascular discoloration is redder than in ratoon stunting disease and extends more into the nodes. Discoloured bundles are usually lacking or very difficult to find in the acute phase.

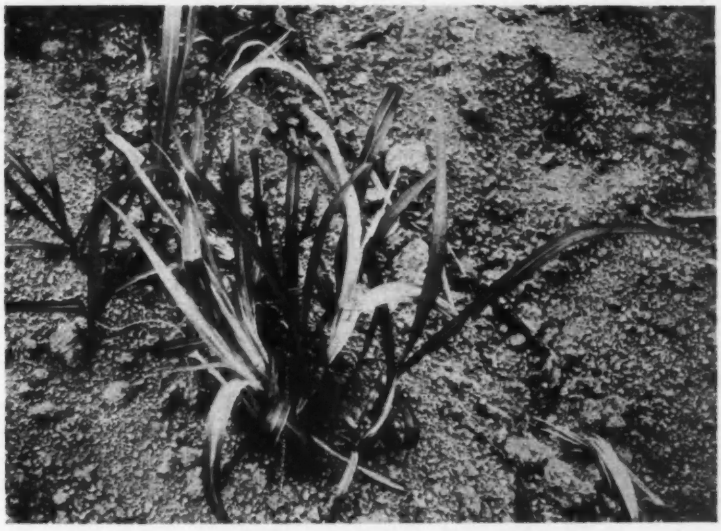

Fig. 31—The acute phase of leaf scald, the in-arching of the leaves and the side shooting are characteristic.

—Photo C. G.Hughes

Control

Measures adopted to control this new outbreak of leaf-scald disease involve the roguing of plots pending the ploughing-out after harvest, the prohibition as a source of plants of all diseased or likely to be diseased fields, thorough inspections of all proposed plant sources and inspections in the growing crop and sterilization of all harvesting blades, whether hand or machine. The disease is a serious one, damage can be severe and losses *are* avoidable; it is up to every farmer to co-operate to the full with Bureau and Pest Board officers.

Destruction of Standover Cane in the Burdekin District

By L. S. CHAPMAN and J. A. HUCKNALL

In the April issue of the Quarterly Bulletin of this year Messrs. Skinner and Freshwater described a method of destroying standover cane by means of an Arthur rotary slasher. This technique produced a mulch through which a ratoon crop was grown.

In the Burdekin where ratoons are less favoured, a method was devised to destroy standover cane without regard to ratooning.

When cane was left to standover in 1958 there was some chance that this cane would be harvested in 1959. Sufficient cane had been planted by this time for the 1959 crop, and it was soon realized that much of the standover cane would have to be destroyed, as harvesting costs were high and quality was low. Furthermore, if this cane were harvested, then the farmers would have had to standover the plant cane for the following year.

In most cases heavy crops of Trojan, 50 t.p.a. and over, remained to be destroyed. Methods of disposal, such as numerous discings with offset discs to incorporate the crop residue into the soil, proved difficult. Decomposition was slow under the dry conditions which prevailed.

The most effective method adopted for destroying this standover in the Burdekin is illustrated by the photographs. The standover was pushed over then rolled to break all sticks at ground level. In some cases offset discs were used to break down the cane. The dozer blade in front of the tractor protected the radiator and helped to flatten the cane.

Fig. 32—The standover was pushed over by a blade in front of the tractor and rolled to break sticks at ground level.

—Photo L. S. Chapman

This operation was performed as soon as it was realized that the cane had to be destroyed. In this flattened condition the cane was allowed to dry out as long as possible. After lying for three to four months under the hot, dry conditions which prevail in the spring and summer months, this bulk of material was burnt before the commencement of the wet season. This left little more than a heap of ashes. The land could then be ploughed, or disced and ploughed, leaving little or no trace of the standover crop.

Fig. 33—Another view of the standover crop being pushed over and rolled.
—Photo L. S. Chapman

Fig. 34—Finishing the job. After finally burning the residue it can be turned into the soil leaving little trace of the standover crop.

Proclamation 40 and Its Requirements

By R. W. MUNGOMERY

An outbreak of leaf scald disease in the variety Q.63 on a few farms in the Mackay and Proserpine areas has made it necessary to adopt measures to restrict the spread of this disease and to stamp it out, if possible.

Leaf scald was known to be present in the Mackay district during the 1930's but, following the extensive growing of a number of resistant varieties such as Co.290, P.O.J.2878, Q.28, Q.50 and Pindar, it was thought that this disease had disappeared as it had not been noticed there after the war years. However, its re-appearance a few months ago came somewhat as a surprise, and the only feasible explanation is that it must have lingered on unnoticed, or in a symptomless condition, in one or other of the susceptible varieties, Clark's Seedling, E.K.28, S.J.2 etc. Although not grown extensively, these varieties have been on the approved lists of the various Mackay mill areas until quite recent years, and most likely it is from a source such as this that Q.63, bred and propagated in the Mackay district, must have become contaminated.

Measures to be taken to prevent the spread of any disease are usually specified in a Government Proclamation and this has been done in the case of Proclamation 40 which was gazetted on 6th August, 1960, under "The Sugar Experiment Stations Acts, 1900-1959", and will operate in respect of the Proserpine, Mackay and Plane Creek districts. This Proclamation supercedes Proclamations 23, 26 and 39 which previously were separately in force in respect of each of these districts, and adds leaf scald to the diseases already specified in these earlier Proclamations.

Briefly, the terms of Proclamation 40 make it illegal to plant any cane infected with ratoon stunting, mosaic, dwarf, leaf scald, or sclerospora diseases. A realistic attitude has been adopted in respect of chlorotic streak disease insofar as, where this disease occurs, there is no known way of ensuring that planting material will remain free of it for any length of time, so no orders have been made in regard to planting material infected with chlorotic streak; however it is left to the grower's good sense to refrain from planting any cane heavily infected with this disease, and to secure clean hot-water-treated cane for his nursery stocks at regular intervals of one to two years.

On the other hand, it is an offence to transfer chlorotic streak diseased cane off any infected farm, for this may result in the establishment of the disease in a hitherto clean area. The same applies to the cane infected with mosaic, dwarf or leaf scald diseases.

As a further measure to prevent cane diseases getting out of hand it is a requirement to destroy, after the second ratoon crop, cane infected with ratoon stunting, chlorotic streak, mosaic, dwarf, leaf scald or sclerospora diseases, and a complementary clause makes it illegal for any mill to accept for crushing purposes any diseased cane which is older than second ratoon, unless specific permission has been obtained beforehand.

Co-operation on the part of everyone concerned should soon result in a decreased incidence of disease, and if a grower is in any doubt regarding his obligations in respect of Proclamation 40, he should consult a Bureau officer from the Central Sugar Experiment Station, Mackay, or alternatively, the Supervisor of his local Cane Pest and Disease Control Board.

A Progress Report on the Chlorotic Streak Research Programme

by B. T. EGAN and O. W. STURGESS

About thirty years ago, chlorotic streak was described as a separate disease of sugar cane and subsequently it was located in several cane growing districts of Queensland. For many years, the disease position remained relatively static from the overall viewpoint, but during the past decade, chlorotic streak has been recorded in several new districts. Now only the three mill areas of the Lower Burdekin are free from the disease. The wider distribution of the disease, together with the suppression and/or elimination of other serious cane diseases has elevated the importance of chlorotic streak disease.

Measures to control the disease by a short hot water treatment of setts (52°C. for 20 minutes) were discovered many years ago, but little progress had been made up to the present time in the determination of the nature of the pathogen or its method of field spread. Observations indicated that drainage waters were associated with its spread in field plantings while it was well known that the disease commonly occurred on poorly-drained soil types. In view of the field association of free water with diseased plants, the culture of cane plants in nutrient solutions was undertaken. Investigations along these lines supplemented other avenues of field investigations.

Preliminary nutrient solution studies, to ascertain a suitable technique, were commenced in 1957. Transmission experiments involving the growth of healthy and diseased plants in the one container followed in 1958. In the first instance, pairs of healthy and diseased companion plants were grown in aerated, and non-aerated solutions and gravel cultures at Brisbane, whilst at Meringa, large troughs containing up to thirty healthy shoots and a number of diseased ones were included in the experiments. The first of a series of transmissions of chlorotic streak from diseased to healthy plants was obtained in late 1958 at Meringa and Brisbane. All techniques provided transmission in varying degrees.

The successful outcome of the nutrient solution techniques stimulated an expanded research programme based largely on the culture of plants in nutrient solutions. To date, the investigations with the above techniques have provided the following interim results :

(a) Transmission of the causal agent from diseased to healthy plants took place when the root system of healthy and diseased plants were kept separate. Healthy and diseased shoots were grown separately in aerated nutrient solutions and arranged as constant pairs; the solutions of the pairs were interchanged every second day, the week-end excepted.

(b) Preliminary investigations which have been designed to determine the effects of different root temperature levels on the expression of chlorotic streak symptoms, by growing diseased plants in nutrient solutions, have provided some significant trends. Also the influence of seasonal variations on temperature at varying soil depths is being assessed in an attempt to correlate the field expression of chlorotic streak with seasonal fluctuations of soil temperatures. The results obtained from these avenues of investigation may provide some satisfactory explanation of the sporadic expression and variable intensity of field symptoms.

(c) It has been illustrated that early ratooning of diseased and healthy shoots growing together in nutrient solutions will lead to an

early assessment of disease transmission. In an experiment at Meringa, one third of the total healthy shoots were ratooned at three months. Seven weeks after ratooning sixty per cent. of the ratooned plants showed chlorotic streak symptoms whilst only fifteen per cent. of the remaining unratooned plants exhibited symptoms.

Further glasshouse and drum experiments in which soil was used as the medium for growth instead of nutrient solutions, have given positive transmission. Several transmissions occurred in one experiment at Meringa which was basically designed to investigate the interaction of different soil types and other superimposed treatments on the expression of chlorotic streak symptoms. Further disease transmissions have been obtained by growing diseased and healthy plants in water-logged soil. This experiment was performed at Brisbane in a glasshouse which has a soil base instead of the normal concrete floor.

With the intensification of the chlorotic streak studies, not only in Queensland but in several other important cane-producing countries, the expectations of determining the causal nature of the disease as well as the mechanism underlying field transmissions, are relatively high.

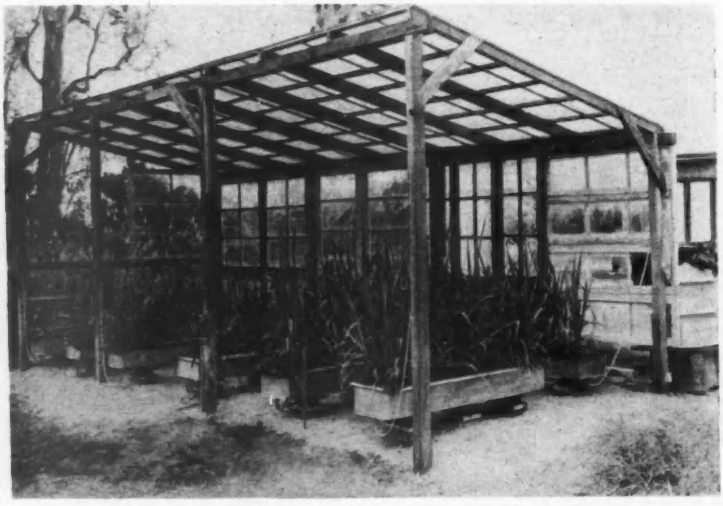

Fig. 35—Chlorotic streak investigations on cane grown in gravel solutions in shelter house.
—Photo B. T. Egan

A Vigorous Hybrid Sugar Cane

By J. H. BUZACOTT

The interspecific crossing of noble sugar cane with wild types such as *spontaneum* and *robustum* often results in the development of very vigorous progeny which has to be backcrossed several times to commercial type parents in order to thicken the barrel of the stalk, increase the sugar content and reduce the hardness. Not every type of wild variety is successful in increasing vigour in its progeny and accordingly, when appraising wild types for introduction into a breeding collection, a rigorous programme of testing must be undertaken in order to select varieties which will induce the desired characters in their progeny.

Amongst the wild *spontaneum* varieties probably the clone known as Burma produces the most vigorous seedlings when crossed with noble canes although a number of different varieties of *spontaneum* have been used successfully in the development of commercial varieties. The wild species known as *robustum* is not so well represented as *spontaneum* in the lineage of commercial varieties, partly because it was not recognised as a separate species until 1928, and partly because it is a much closer relative of the noble species and does not give such diverse types of seedlings when crossed with it as *spontaneum* does. There are, however, now a great number of *robustum* varieties available to cane breeders, most of which were collected by the New Guinea expeditions of 1928, 1937, 1951 and 1957. So far but few of these have shown much value as parent canes but one notable exception is a *robustum* known as 51N.G.140 collected on the bank of the Laloki River in Papua. This, itself, grows into a tall thin bamboo-like cane but when used as a parent appears to confer a somewhat thicker stalk and better stooling on its progeny than other *robustums* we have tested. A first cross, using 51N.G.140 as the seed producing parent and the Javanese commercial hybrid P.O.J.-2878, also known as "Java" or "Won-

Fig. 36—53B45 at Meringa Station, the vigorous hybrid between a *robustum* variety and P.O.J.2878.
—Photo J. H. Buzacott

der Cane", as the male parent, resulted in a very vigorous variety known by the number 53B45, which is now a valued member of the Meringa breeding collection. This variety is shown in the accompanying picture, being examined by the Senior Geneticist at Meringa, Dr. Skinner. From the height of his figure, it can be seen that there is some 12 feet of cane on the stool. It is far more vigorous than either its female parent, which may be seen in the picture behind Dr. Skinner, or P.O.J.2878 itself. The latter variety is not a pure noble but has one-eighth *spontaneum* blood in its breeding so that 53B45 is a hybrid with three distinct species represented in its parentage. If portion of its great vigour is maintained in subsequent back-crosses to commercial types, it is hoped that this hybrid may prove a useful parent. However, breeding in a new strain of wild blood is a slow process. Whereas it normally takes about ten years to bring a new variety from the initial cross to the stage of distribution, when a wild strain is being introduced, the subsequent dilution of the proportion of wild blood, which is necessary before commercial types are developed, takes many more years and the breeder would be very lucky to develop a *robustum* or *spontaneum* into a commercial variety in less than twenty years.

Ratoon Stunting Disease Threatens a Valuable Variety

It is always of interest to examine statistics supplied in respect of cane varieties, and those recently supplied by the Supervisor of the Plane Creek Cane Pest and Disease Control Board, Mr. E. D. Cran, should be of particular interest to all growers in the Plane Creek district, as well as to others in neighbouring mill areas.

In this instance, the figures obtained following a survey for disease revealed that at least 4 per cent. of the cane was showing symptoms of ratoon stunting disease. However, a disturbing feature of the survey was that 96 per cent. of the infected fields involved the variety Q.58, while the remainder comprised Pindar, Q.63, Q.28, Trojan, N.Co.310 and Q.68. Admittedly, Q.58 occupies a high proportion of the area, but it does not differ substantially from Q.50 in this respect, yet the latter showed no fields infected by ratoon stunting disease. Another point of some concern is that Q.58 is quite sensitive to ratoon stunting disease, so the losses could become quite severe if this disease were allowed to go unchecked and make further inroads into Q.58.

It is realized that weather conditions may have been particularly suitable for the appearance of disease symptoms in Q.58, and on that account we should not adopt an ostrich-like attitude and assume that the other varieties do not require further hot water treatment periodically. However, there is clearly a lesson to be learned from the trend observed at Plane Creek, and that is that Q.58 must receive constant attention to keep it free from ratoon stunting disease. Other areas where this cane is favoured would also do well to heed this warning and, by having their nursery stocks regularly hot water treated, preserve for themselves a variety which is proving to be a very valuable one.

—R.W.M.

Cane Variety Changes on the Maroondan Soils

By J. ANDERSON

The Maroondan soils are rather unique insofar as Queensland cane lands are concerned. The area is west of Bundaberg being separated from that district by a series of low hills. The soil consists of black clay loams of the montmorillinite or "expanding" clay type. This particular clay is quite distinct from the kaolin clays which characterize most of the State's cane growing areas. When wet, montmorillinite clays swell considerably to become very sticky and intractable. In drying, these soils contract or shrink, producing large cracks many inches wide and often feet deep. Consequently working of the soil is difficult and for optimum benefit cultivation is confined to the brief periods during which the correct soil moisture prevails.

The Maroondan area has a lower rainfall average than that of coastal Bundaberg and dry periods are frequent. During prolonged dry conditions, the soil cracks badly with loss of soil moisture and breakage of the rooting system. Thus crop growth suffers considerably. Another feature is that being drier, this area is more subject to severe frosting of cane crops. Therefore, cane varieties that are grown must exhibit the ability to withstand and recover quickly following dry periods and/or be tolerant to frost.

C.P.29/116 has been the major variety for many years on these droughty soils. It has proved its ability to withstand harsh conditions and produce a crop. The main disadvantages of this variety however are its low c.c.s. early in the season and its sensitivity to frost. When frosted, damage is often very severe, necessitating early harvest and, since C.P.29/116 is a late maturer, very low c.c.s. can be expected from early harvested frosted blocks.

Over the last few years, N.Co.310 has become the major variety on this soil type. By virtue of being the most frost tolerant variety on the approved list, N.Co. 310 has displaced a large percentage of C.P.29/116. It produces a good crop in an average season and c.c.s. content both early and late has been very good. Thus even if frosted, this variety will usually yield good c.c.s. figures early in the season. While arrowing freely in the Bundaberg area, N.Co.310 on the Maroondan soils does not arrow so profusely and so can be stood-over more successfully.

As these two varieties produce the bulk of the crop from the Maroondan soils, it is interesting to note the change in the percentage of these canes harvested in the whole of the Gin Gin Mill area which embraces portion of this soil type. The percentages of C.P.29/116 in the Maroondan area will be higher than the mill figures quoted below.

The other approved varieties contribute only small percentages of the crop harvested at Maroondan. In previous years, Q.47 was planted on the more severely frosted sections where, while yielding a lighter tonnage, it withstood frosting better than C.P.29/116 and gave superior c.c.s. figures, but N.Co.310 has replaced

Variety	1954	1955	1956	1957	1958	1959
CP29/116 ..	49.0	46.0	43.0	35.0	25.9	7.4
NCo310		8.1	13.1	22.7	44.8	59.4

the bulk of this variety also. The newer varieties, Q.61, Q.58 and Q.70 are grown in limited amounts. All these canes have produced satisfactory crops but they do not exhibit the frost tolerance of N.Co.310 and this factor will probably limit the quantity grown.

New seedling varieties are at present being tested in this area. Over thirty have been planted and although some are showing promise, further trials are necessary before their reaction under these conditions can be assessed.

Forecast of Approved Varieties for 1961

In accordance with usual practice, the Bureau has prepared a forecast of the changes it is proposed to make in the approved variety list of 1961. Any interested farmers' organizations which consider alterations should not be made along the lines indicated, or wish to submit any other changes, are invited to submit their views to the Director of Sugar Experiment Stations before 30th November, 1960. Any objections against varietal deletions, or suggestions for additions, must be accompanied by a detailed statement of the reasons for such objections or suggestions. No action can be taken in respect of late or unsubstantiated requests. The proposed changes are as follows :—

Hambledon—Add Co.475.

Goondi—Add Co.475 and Q.66. Delete Badila Seedling*.

South Johnstone—Add Q.66. Delete Badila Seedling* and Q.44.

Mourilyan—Add Co.475 and Q.66. Delete Badila Seedling*.

Tully—Add Q.66. Delete Badila Seedling* and Clark's Seedling.

* In future, Badila Seedling will be included in the name Badila.

Invicta, North of Townsville—Add Q.68 and Co.475. Delete Eros and Ragnar.

Invicta, South of Townsville—Add Q.58 and Q.63.

Proserpine—Delete C.P.29/116.

Cattle Creek—Delete Q.28 and Comus.

Racecourse—Delete P.O.J.2878 and Q.28.

Farleigh—Delete Q.28.

North Eton—Delete P.O.J.2878.

Marian—Delete Comus.

Pleystowe—Delete Q.28.

FREE SERVICES TO CANE GROWERS

The Bureau offers the following free services to *all* cane growers in Queensland:—

Soil Analysis and Fertilizer Recommendations

Your soil will be analysed by the most modern methods, and a report will be posted containing a recommendation covering the type of fertilizer required, the amount per acre, the need for lime, and other relevant information. Phone the nearest Bureau office and the soil samples will be taken as soon as possible.

Culture for Green Manure Seed

Cultures and instructions for the inoculation of the seed of cowpeas, velvet beans, mung beans or any other legume will be posted to any cane grower upon request to The Director, Bureau of Sugar Experiment Stations, Brisbane. Allow a week after receipt of your letter for the culture to be prepared and posted, but as the culture will easily keep a month or so it is a good idea to get your culture when you get your seed. If sowing is delayed, ask for another batch of culture; there is no charge.

Advice on All Phases of Cane Growing

The Bureau staff is at the service of all cane growers. They can best advise you on matters pertaining to varieties, fertilizers, diseases, pests, drainage and cultural methods. Bureau officers are available in every major cane growing district. A phone call will ensure a visit to your farm.


WATSON PEARSON
& COMPANY